Effectiveness of a Clinical Pathway for Inpatient Asthma Management

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ABSTRACT. *Background.* **Clinical pathways for asthma are tools that have the potential to improve compliance with nationally recognized management guidelines, but their effect on patient outcomes has not been documented.**

Objectives. **To determine the effect of an asthma clinical pathway on patients' length of stay, use of nebulized β-agonist therapy while hospitalized, and use of acute care clinics for 2 weeks after discharge.**

Design/Methods. **The study was a randomized, controlled trial. Patients between the ages of 2 and 18 years admitted with an asthma exacerbation and not under the care of an asthma specialist were eligible for the study. Patients were randomized either to a conventional ward (control group) or to a ward using the clinical pathway (intervention group). For 2 weeks after discharge, we collected data to determine whether patients visited a health care provider for worsening asthma.**

Results. **One hundred ten patients (26%) were enrolled. Control and intervention groups had similar demographic and asthma severity profiles. The intervention group had an average length of stay 13 hours shorter than did the control group. In addition, at every dosing interval, the intervention group received less nebulized β-agonist therapy. There were no deaths in either group.**

Conclusion. **A clinical pathway for inpatient asthma decreased the length of stay and β-agonist medication use with no adverse outcomes or increased acute-care encounters through 2 weeks after discharge.** ***Pediatrics* 2000;106:1006–1012;** ***asthma, clinical practice guidelines, clinical pathways, health services research.***

ABBREVIATIONS. NHLBI, National Heart, Lung, and Blood Institute; ED, emergency department.

Asthma is the most common chronic childhood illness in the United States,[1,2] affecting 4.8 million children and adolescents in 1996.[3] Asthma accounts for over 2 million pediatrician visits per year.[2] With an average length of stay of just under 3 days for each inpatient admission and a cost of over 1 billion dollars in direct medical expenditures, asthma poses a considerable economic burden on our health care system.[4,5] Many of these hospital admissions can be prevented by aggressive preventive care[6,7]; guidelines have been in existence for some time that are rarely adopted in hospital practices.[8] Although this report provided comprehensive information about the pathophysiology of asthma and specific management recommendations, the information was not provided in a format conducive to the needs of inpatient multidisciplinary teams caring for these patients.

Clinical pathways are tools that outline a sequence of clinical evaluations and interventions for patients with specific conditions.[9] These evaluations and interventions ideally are established from published clinical guidelines. When there is no published evidence to guide a decision, the clinical pathway uses expert local or national consensus to choose an appropriate plan of care. Numerous studies have demonstrated that a well-designed clinical pathway is an effective means of sustaining quality, while controlling costs in the management of certain disease entities.[10–15] Many hospitals have implemented and mandated the use of these tools for a variety of their high-cost or high-volume diagnoses.[16]

Our institution recognized the potential improvement in outcomes afforded by adopting the guidelines published by the National Heart, Lung, and Blood Institute (NHLBI). Therefore, we assembled a multidisciplinary team to develop a clinical pathway based on these guidelines.

Table 1 outlines the key features of our clinical pathway. Previous studies of asthma clinical pathways have demonstrated a decrease in laboratory and radiology charges[17] as well as more consistent conversion to metered dose inhalers in one emergency department (ED)[10] and improved use of spacers and oral steroids in another ED.[13] However, none of these studies has shown an effect on the patients' length of stay. The overall goal of our pathway was to improve compliance with the guidelines for managing asthma admissions, and to improve patient care by coordinating actions among the various providers who formed our asthma care team. We hypothesized that with better coordination of care and with the adoption of practices as outlined in Table 1, length of stay and use of nebulized β-agonists during admission both would decrease.

One of the most significant results of our team meetings was a decision to rethink how we weaned a patient's nebulized β-agonist therapy. In nearly all cases, nebulized β-agonists were weaned after a physician assessed the patient and wrote an order to change the frequency of these medications. Our multidisciplinary team raised 2 concerns. The first was that the assessment was not standardized, making the weaning procedure subject to whatever approach was preferred by specific physicians. The second

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TABLE 1. Key Features of the Clinical Pathway

Nurse-driven protocol for weaning bronchodilators
Peak flow measurement (for children over age 5 y) every 4 h, before and after nebulization
Asthma teaching essentials, including spacer and peak flow meter training, beginning the day of admission
Prescriptions for home therapies given to family before discharge
Early contact between attending physician and private medical doctor to establish plan for asthma management and improve coordination of care

concern was that residents in training simultaneously assume the role of primary inpatient care provider, teacher, administrator, and student. Weaning the nebulized β-agonists of a patient with asthma is one of many responsibilities in this setting and has a particularly low priority in the evening and early morning hours, when fewer staff are available. Similarly, respiratory therapists are not adequately staffed to assess each patient and administer each nebulized β-agonist. Attending staff and senior residents are less available than are interns and would not be likely to provide assistance in a timely manner. We hypothesized that an approach using our registered nursing staff to evaluate and modify nebulized β-agonist therapy might improve the rate and consistency of weaning. However, this change in practice could either improve or worsen other outcomes, including length of stay and readmission rates. For example, the pathway could increase the number of subsequent urgent care, ED, or inpatient encounters for patients who were discharged too quickly. Therefore, we initiated a study to determine the impact of a clinical pathway for inpatient asthma management on the patients' duration of hospitalization, amount of bronchodilator therapy, and frequency of readmissions within 2 weeks of discharge.

METHODS

Study Design

This was a randomized, controlled study conducted from the summer of 1995 through the summer of 1997 at Johns Hopkins Hospital, an urban academic medical center. There are ~500 pediatric admissions for asthma annually, accounting for just over 7% of all admissions to the pediatric service. The clinical pathway was constructed over a 4-month period before beginning the study. A pediatric multidisciplinary team, consisting of general hospital-based physicians, pulmonologists, emergency medicine physicians, outpatient physicians, clinical nurses, a respiratory therapists, social workers, and other members of our asthma care team participated actively in the design of the pathway. In addition to the pathway, a weaning protocol was constructed, based on the NHLBI guidelines (Fig 1). Four months before starting the study, all nursing staff on our clinical research (intervention) unit were taught how to assess patients with asthma using a train-the-trainer approach, with 1 attending physician and 4 senior residents as the educators. This group used a standard teaching plan that had been constructed by a nurse educator in our department to train the senior nurses on the intervention unit. These senior nurses then conducted one training session on the unit during each nursing shift, and conducted additional one-on-one sessions as new nurses were hired during the study. The senior residents who helped with training completed their residency before the start of the study and, therefore, were not included in the study. Nurses and physicians at this site were familiar with the design and operation of clinical pathways.

The clinical pathway was designed for patients between 2 and 18 years of age, who were being admitted to the hospital with a primary diagnosis of an asthma exacerbation, and who were not cared for by an asthma specialist. Patients meeting these criteria and whose families had a phone or pager were eligible for the study. Patients admitted to the intensive care unit and patients who had previously been enrolled in the study were excluded. Study enrollment also required that inpatient beds be available in both our intervention and control sites at the time of admission, so that randomization could take place.

After written, informed consent was obtained, each patient's family completed an enrollment questionnaire, after which the patient was randomized to a bed on either the intervention unit or a control unit. The control and intervention units were located on different floors within the hospital. Although housestaff coverage was the same on both units, there was no exchange of nursing staff between the control and intervention units. Nurse-to-patient ratios were identical on both units, with more acutely ill patients receiving a more nursing time (1:2–3) and more stable patients receiving a bit less time (1:4–5). Staff demographics and experience in nursing were similar. Patients admitted to the intervention unit received care according to the clinical pathway. Nursing staff on the intervention unit assessed patients before each nebulized β-agonist, using the guidelines in Fig 1. If the patient met criteria for changing the frequency of therapy, then the nurse notified the house officer on call, who assessed the patient and determined whether the patient's therapy could be weaned. If the patient did not meet criteria for weaning, the nurse administered the treatment and reassessed the patient to ensure that the patient's symptoms were not worsening. Nursing staff on the control unit followed our usual standard of care, including obtaining vital signs before administering each nebulized β-agonist. They did not determine whether patients were ready to be weaned from their medications. However, they would notify the house officer if asked to before administering a nebulized β-agonist (as was often the case when house officers were ready to assess a patient for weaning). Control patients received education about the use of an inhaler and spacer, as well as some coordination of postdischarge care from our case management team.

After patients were discharged, one of the investigators (K.B.J.) reviewed the chart and the medication administration documentation to record the time the discharge order was written, the actual time of discharge, and details about when and what medications were administered during the hospital stay. Discharge medications were written on a follow-up form, which was given to a research assistant. This person was blinded to the patient's group assignment. The research assistant conducted phone fol-

	From Q2 To Q3 hours	From Q3 To Q 4 Hours	From Q4 To Q 6 Hours
Peak flow (if over age 5 yr.)	50-70% of predicted after therapy	70%-90% of predicted after therapy	70-90% of predicted BEFORE therapy
Wheezing	Inspiratory/expiratory with good air movement	expiratory (mostly)	minimal wheezing
Work of breathing	no nasal flaring, moderate retractions	minimal retractions (intercostal)	no retractions
Breath sounds	decreased but improving	slightly decreased	normal except wheezing

Fig 1. Weaning guidelines for asthma inpatient clinical pathway.*

low-up of each patient at 1 day, 1 week, and 2 weeks after discharge, to determine whether there had been any unscheduled health care encounters related to asthma. For patients who could not be reached by phone at the end of 2 weeks, we reviewed the medical records and computer scheduling system data at our site, as well as those of our affiliated health management organization, for evidence of unplanned encounters related to asthma.

Analysis

The study was designed to evaluate 4 main variables. The first of these, the duration of hospitalization, was defined as the number hours that elapsed from the first every 2-hour bronchodilator until the time the discharge order was written. We chose to use the first every 2-hour nebulized β-agonist as a standard starting point, which also is a point at which we typically admit patients to a bed outside of intensive care. The study also evaluated the number of nebulization therapies, defined as the number of nebulized β-agonists given during the hospitalization (within the time period above); and the number of unplanned health care interventions, defined as the number of urgent care, emergency department, or inpatient encounters related to worsening symptoms of asthma within 2 weeks of discharge. Finally, the study examined the hospital charges for each patient.

Data for the first 2 dependent variables were obtained by reviewing the clinical pathway, and the medical record after the patient was discharged. A research assistant obtained data about unplanned health care interventions. Each family completed a survey at the time of enrollment to provide data about the patient's disease severity, medical history, home environment, and socioeconomic status. Hospital charge data were obtained from our inpatient charge database.

Initial sample size was calculated at 120 patients per group to have 80% power to detect a 10% decrease in the number of unplanned health care interventions, using a 2-tailed α of .05. A sample size of 50 patients per group was required to detect a 20% difference in the duration of hospitalization using similar parameters. Randomization was blocked to allow the study to be safely discontinued at 100 patients. Because of a need to make changes in our practice pattern as described in the clinical pathway, and because study enrollment was slowing down attributable to limited bed availability, we elected to terminate the study after just over 100 patients had been enrolled.

Data were analyzed using the SPSS statistical package.[18] χ^2 and Fisher's exact tests were used to characterize any differences between our control and intervention groups as measured by nominal variables, and the Student's t test was used for interval and ratio data. Analyses of covariance and multivariate regression techniques were used to determine the effect, if any, that confounders had on our outcomes of interest. Institutional review board approval was obtained for this study.

RESULTS

Enrollment

During the study, 432 patients met criteria to be enrolled into the study. Of these, 314 patients were admitted on days when a bed was not available on either our intervention or our control units. Therefore, 118 patients were approached to participate in the study. Six of these patients did not wish to participate. In addition, 2 patients who were admitted subsequently asked to be disenrolled from the study and were excluded from analyses, leaving a total of 110 patients, or 26% of the potential enrollees, who participated in the study. One of the patients who disenrolled did so because of conflicting willingness on the part of the parents to be involved in the study. This child had been enrolled in the control group. The other child's parent disenrolled after finding that her child, who also was to be assigned to the control group, would have to wait for an inpatient bed. Both children had uncomplicated inpatient stays.

Control Versus Intervention Characteristics

Table 2 summarizes the demographic and asthma severity characteristics of the control and intervention groups. More intervention patients had received steroids before arrival to the ED (22 vs 10; $P = .02$). The control patients were younger on average (8.2 vs 6.6 years; $P = .04$). There was no significant difference between the number of preschool or adolescent patients in either group. Otherwise, the 2 groups were similar. As is shown in Table 2, there was no difference between the 2 groups with respect to common surrogates for disease severity (including school days missed and parent's perception of asthma severity), home pharmacotherapy, reported triggers, or their management in the ED. Both groups had similar pulse oximetry values on arrival to the ED, similar needs for supplemental oxygen at admission, and similar average respiratory rates on admission.

Length of Stay and Therapy Differences

The duration of hospitalization was 13 hours shorter for the patients managed according to the clinical pathway (53.7 vs 40.3 hours; $P < .01$). This difference was not affected when controlling for the administration of steroids before arrival ($F = .06$), and was independent of patient age ($F = 3.2$; $P > .05$). The clinical pathway group had a larger percentage of patients discharged within the first 24 hours of admission (38% vs 14.5%; $P < .01$), as shown in Fig 2. In addition, there was a significantly shorter duration of every 2-hour nebulized β-agonist therapy in the clinical pathway group, as shown in Table 3, with a trend toward a smaller mean number of nebulized β-agonists at every frequency at which they were administered. Table 4 shows the effect of the clinical pathway on other variables of interest. There was a significant difference between the routine (room) charges and medication administration charges between the 2 groups. In addition, there was a trend toward lower mean medication and laboratory tests charges between the groups. There was no significant difference in the use of other resources between groups. There was an expected significant difference between the 2 groups with respect to therapy charges, attributable to the fact that both nurses and respiratory therapists administered nebulized β-agonists on the control unit, while only nurses administered this therapy to patients on the clinical pathway.

Adverse Events

Phone follow-up at 2 weeks was completed for 77 patients. The other patients either were lost to follow-up after discharge ($n = 21$) or had phone follow-up at 1 week, but not at 2 weeks after discharge ($n = 12$). Charts and electronic schedule records were reviewed for all patients, regardless of whether phone follow-up was completed. One patient in each group made a phone call to their care provider because of worsening asthma symptoms in the 2 weeks after discharge. Two patients in the control group had unscheduled clinic visits for asthma symptoms. No patients were admitted to the hospital in the 2

TABLE 2. Comparison of Clinical Path and Control Group Demographics and Disease Severity*

Variable	Clinical Path	Control	*P* Value
Total subjects	55	55	NS
Average age†	8.2	6.6	.04
Gender (# male)†	38	32	NS
Race (# black)†	50	54	NS
Medical assistance (%)†	81	80	NS
Arrived from home (%)	76	81	NS
Caregiver a high school graduate (%)	34	38	NS
Number children (<14 y) in home	2.0	2.5	NS
ED visits/y	4.2	3.4	NS
Admissions/y	1.7	2.1	NS
School days missed/y	11	9.9	NS
Perception of severity (% without symptoms between episodes)	68	58	NS
Comorbidities			
Atopy	14	8	NS
Heart disease	2	0	NS
History of sinusitis	8	4	NS
History of pneumonia	17	13	NS
Chronic lung disease of prematurity	5	3	NS
Human immunodeficiency virus	1	0	NS
Cystic fibrosis	0	0	NS
Exposure to tobacco smoke	22	18	NS
Exposure to pets in the home	33	35	NS
Expremie	11	4	NS
Home medications			
Metered-dose inhaler β-agonist	16	21	NS
Nebulized β-agonist	30	25	NS
Chronic steroids	1	2	NS
Cromolyn sodium	22	17	NS
Inhaled steroids	8	11	NS
ED management			
Prednisone before arrival	22	10	.02
Albuterol nebulizer/metered-dose inhaler before arrival	25	17	NS
Albuterol doses in ED	6.1	6.2	NS
Ipatropium bromide doses in ED	1	1.1	NS
Severity on admission			
Spo_2 on arrival	94	93	NS
On supplemental oxygen at admission	20	21	NS
Respiratory rate on admission	40	38	NS

NS indicates not significant.
* Data obtained from parent report.
† Values do not differ from those of general hospital admissions for asthma.

weeks after discharge. One control patient had a visit to the emergency department within the 2-week period with a chief complaint of wheezing but was free of symptoms and subsequently discharged after 3 nebulization therapies. There were no deaths in either group.

DISCUSSION

This study demonstrates that a clinical pathway for children with asthma, using a nurse-driven weaning protocol adopted from nationally accepted guidelines, significantly decreased the length of hospitalization, the charges associated with the admission, and the overall nebulized β-agonist use. What may seem to be a modest decrease in the length of stay (13 hours) has significant implications for an inpatient unit, in addition to the modest decrease in charges incurred by each patient. Consider, for example, the impact that 13 additional hours in the hospital will have on bed availability. If we assume that we admit 600 patients each year, with an average length of stay of 53.7 hours, then these patients will occupy 600 beds for 31 800 hours. If we decrease the length of stay to an average of 40 hours, we will create 7800 hours of bed availability, which will make room for 195 additional patients. From the perspective of an insurer, this pathway will reduce the per-patient charges for an inpatient stay, including inpatient physician professional fees, and medications. These families also would welcome other improvements that relate to a shorter length of stay, including reducing costs associated with transportation to and from the hospital, lost work hours, and potentially less nosocomial spread of disease.

Our weaning protocol is based on clinical parameters suggested by the NHLBI asthma guidelines.[4] We asked primary nurses to wean patients from nebulized β-agonist therapy in our institution because our registered nurses are primarily responsible for obtaining vital signs and administering these medications, and because we do not have 24-hour respiratory therapy on a consistent basis. Nevertheless, we believe that either nurses or respiratory therapists could function in this role, if they have been suitably educated and tested.

This is, to our knowledge, the first study demonstrating an impact of an asthma clinical pathway on the length of stay. Two points should be noted about

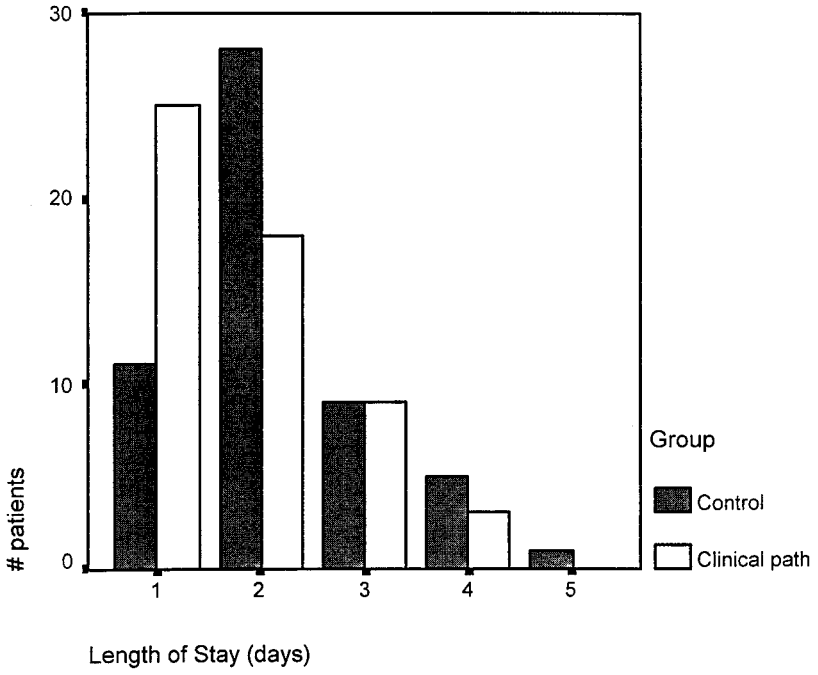

Fig 2. Comparative length of stay distributions for clinical path and control groups.

TABLE 3. Comparative Frequency of β-Agonist Administration

Nebulized β-Agonist Frequency	Number of Doses		
	Control	Clinical Path	*P* Value
Every 2 h	6.5	4.5	.02
Every 3 h	5.9	3.7	.002
Every 4 h	4.7	3.5	.044
Every 6 h	2.2	1.4	.01
Every 8 h	0	.1	.32

TABLE 4. Comparative Outcomes in Clinical Path and Control Groups

	Clinical Path (n = 55)	Control (n = 55)	*P* Value
Routine charges (room charge)	$2407	$3116	<.001
Medication charges	$ 129	$ 153	.24
Laboratory test charges	$ 21	$ 42	.10
Therapy charges (respiratory therapy)	$ 42	$ 250	<.001
Follow-up appointment scheduled	66%	77%	.20
Prednisone at discharge	98%	98%	1.00
Days to follow-up appointment	5	5.4	.81

this conclusion. The first point is that we reported a length of stay in hours rather than in days, which is the more common practice. Although many hospitals bill patients based on whether they were present on a midnight census, this crude measure of length of stay does not account for overall hospital census, which is a more accurate depiction of activity. Using a length of stay measured in hours allows us to recognize the potential for a higher overall number of admissions. More admissions benefit both the hospital and any urgent care facilities that might be holding patients in anticipation of a bed becoming available. The second point is that at least one other study by Kwan-Gett and colleagues[17] reported an average length of stay of 2 days, which is extremely short—3 days shorter than the national median length of stay. The study by Kwan-Gett might have suffered from a ceiling effect, making it less likely to show an advantage to using clinical pathways even if one existed.

One of the interesting outcomes of the clinical pathway was a more rapid weaning of bronchodilators in the intervention versus the control group. By diminishing the duration of more frequent therapies, this approach will decrease the time that the health care team spends administering medications and checking vital signs—time that can be spent assessing the patient and educating the patient and family. In fact, the rapid weaning of bronchodilators could potentially relieve nurse and respiratory staffing, because these patients can be managed with a slightly lower nurse-to-patient ratio. Because more frequent administration of albuterol is occasionally associated with insomnia, tremor, agitation, hyperglycemia, hypokalemia, and cardiac complications,[19] more rapid weaning of bronchodilators also will decrease the risk of iatrogenic complications.

The intervention in this study was clearly more complex than simply allowing nursing staff to have autonomy over the weaning of β-agonist therapy. As shown in Table 1, the clinical pathway described an approach to asthma education and discharge planning. Although this study had insufficient power to determine whether the clinical pathway reduced acute care encounters in the period after discharge, we are reassured that our approach to education and discharge planning is likely to decrease postdischarge symptoms. However, a larger study will be needed to better estimate the effect of improved discharge planning and asthma education.

One of the unanswered questions arising from this project is the effect of clinical pathways on overall nursing workload. This pathway makes nurses ac-

countable for weaning the frequency of patient's medication and educating patients and families. Rather than increasing the amount of time a nurse spends with each patient, nurses who use this pathway believe it optimizes their time. Nurses believe that it takes 5 minutes to set up a nebulized bronchodilator therapy. Because we are able to wean patients from more frequent therapy, we decrease the time nurses are engaged in this activity. Nurses routinely have assessed patients in our institution—the pathway allows them some autonomy in decision-making based on their assessment. The education aspects of the pathway should not increase nursing time, because our nurses have been educating patients and families before we standardized the process. The less organized educational efforts that nurses used before the pathway resulted in time spent finding all the necessary handouts and determining what the patient had already been taught. Therefore, their assessment of the pathway is that it saves time, rather than having the opposite effect on their day.

Clinical pathways may affect patient care in other ways. For example, this pathway would be expected to increase the caseload of asthmatics in our hospital by making more beds available for admissions. The rapid admission and discharge of these patients will increase the intensity of care delivered by our nursing and resident staff. From the nursing perspective, more intense care demands higher staffing, which is unlikely to happen without a significant increase in patient acuity. From the standpoint of resident education, increased asthma admissions resulting from the pathway may or may not improve resident education. Taking on a more reactive stance toward medication weaning could detract from the educational goals of a residency, but admitting more patients with asthma could enhance the education about asthma. In the managed care era, this question becomes extremely important and should be the subject of additional study.

Study Limitations

This study was limited primarily by an inability to enroll some eligible patients because of bed shortages. Before patients could be approached about this study, a bed had to be available on both our intervention and control units. As the study proceeded, a high-inpatient census made beds largely unavailable. Therefore, in the interests of the patients, we chose to assign these patients to the first available bed rather than to enroll them in the study. There was no difference between the length of stay for these patients and for our control group. However, we had adequate power with our existing sample to detect a clinically significant difference in length of stay but not to detect a 20% or smaller difference in unplanned health care interventions. Therefore, the limited enrollment could disguise a negative effect that the clinical pathway might have had on unplanned health care interventions relative to our usual practice pattern.

Our intervention group had a higher percentage of patients who received steroids before their arrival to the ED. Although studies have shown that early use of steroids in an asthma exacerbation may reduce the need for hospitalization,[20–23] few studies have evaluated whether such therapy affects the outcome of patients who are admitted.[22] In our study, controlling for the administration of steroids before arrival by analysis of covariance was not associated with a shorter length of stay. There also was a statistically significant difference in the mean age of our 2 groups. However, there was no significant difference between the number of preschool children or adolescents in either group. In addition, analyzing our data with and without appropriate controls for steroid use and age did not significantly affect the outcome variables of interest.

Resident education about asthma has become an important topic at most academic medical centers. One possible confounder of this study is that residents could have become more knowledgeable about how best to manage patients with asthma during the study. Because any such improvement in asthma management should have been evident in both our control and intervention groups, it would have served to decrease rather than increase the differences in outcomes between these groups. A similar result should have been seen from any Hawthorne effect[24] related to the fact that residents were aware that they and their patients were being studied.

Because the intervention unit had a smaller possible census than did the control units, the nursing ratio could have been more favorable for aggressive management of asthma at times (and less favorable at other times). This might have contributed to a lower length of stay and a more rapid weaning of patients. However, we are reassured by the lack of ED or inpatient encounters after these discharges, which suggest that patients did not experience a worsening of their symptoms after discharge.

Implications

This study provides further evidence of the value of guidelines such as those developed by the NHLBI. Such guidelines, when carefully evaluated and customized for a particular setting, can have a significant effect on the management of patients and on the outcomes of interest to patients, staff, and administrators. As in all cases, clinical pathways for diagnoses such as asthma can form a framework for performance improvement in a variety of areas. Clinical pathways also enable an institution to clearly identify processes that vary from an established guideline and to investigate whether these practices are associated with improved outcomes, worsened outcomes, or no change in outcomes. These investigations lead to adoption of new processes or recommendations to discontinue existing processes. In our institution, this study provided evidence to allow us to implement a new approach to asthma management throughout the institution. It confirmed our hypothesis that our nursing staff could safely and reliably assess patients and improve our ability to wean the frequency of their medications in a timely manner. Hopefully, additional studies based on the

NHLBI guidelines will further improve our ability to manage this disease.

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JAPAN'S EMPLOYERS ARE GIVING BONUSES FOR HAVING BABIES

In the hallways, bathrooms, and lunchroom of the Bandai Corporation, a major Japanese toy maker, the talk these days revolves around one topic—an announcement that the company will pay employees 1 million yen, or $10,000, for every baby they have after their second child.

Although many other companies give congratulatory bonuses to workers who become parents, Bandai is offering the largest baby bounty in Japan, which is struggling to reverse record low birthrates that pose many long-term problems.

Sims C. *New York Times.* May 30, 2000

Noted by JFL, MD